

10/784,553

REMARKSA. Period For Reply

A shortened statutory period for reply was set to expire three months from the mailing date of the Office Action of October 13, 2004. October 13, 2004 plus three months is January 13, 2005. January 13, 2005 plus one month is February 13, 2005. February 13, 2005 falls on a Sunday. This paper is being filed on or before Monday, February 14, 2005 with a petition for an extension of time for one month.

B. Status

The Office Action of October 13, 2004 was nonfinal.

C. Disposition Of Claims

Claims 1-8 are pending.

D. Application Papers

At the appropriate time, approval of the formal drawings, submitted with the filing of this case on February 23, 2004, would be appreciated.

E. Priority under 35 U.S.C. §§ 119 and 120

Acknowledgement of the claim for foreign priority would be appreciated.

Receipt of the certified copy was acknowledged on page 2 of the Office Action of October 13, 2004. This is appreciated.

As to domestic priority, this case does not claim domestic priority.

F. Attachments

Applicant filed two PTO-1449 forms in this case (one with the filing of this case on February 23, 2004 and one on

(17979.DOC) (Amendment and Remarks--page 16 of 26)

10/784,553

October 17, 2004). The PTO-1449 form of February 23, 2004 was signed and all of the references listed on the form was initialed by the Patent Office. This is very much appreciated.

As to the PTO-1449 form filed October 17, 2004, which submitted art from an EPO Communication dated September 3, 2004, consideration of such art would be appreciated. Please see section J of this paper.

G. Basis for amendments

G.1. Basis for any amendments to the specification

Basis for each of the amendments to the specification is found in each of the respective amended paragraphs.

G.2. Basis for any amendments to the abstract

Basis for each of the amendments to the abstract is found in the abstract itself.

G.3. Basis for any amendments to the claims, and basis for any new claims

Basis for the amendment to claim 1 is found at the following locations in the specification: 1) from page 2, line 28 to page 3, line 10; 2) on page 7, lines 9-16; and 3) on page 16, lines 19-22.

Basis for the amendment to claim 3 is found at least on page 12, line 25 to page 13, line 8.

Basis for the amendment to claim 4 is found at least on page 11, lines 23-26.

Basis for new claim 5 is found at least on page 13, lines 9-15.

Basis for new claim 6 is found at least on page 13, lines 15-17.

(17979.DOC) (Amendment and Remarks--page 17 of 26)

10/784,553

Basis for new claim 7 is found at least on page 22, lines 3-10.

Basis for new claim 8 is original claim 4.

H. The Office Action

H.1. Acknowledgement of papers submitted under 35 U.S.C. 119(a)-(d)

On page 2 of the Office Action, receipt was acknowledged of papers submitted under 35 U.S.C. 119(a)-(d). This is appreciated. (Acknowledgement of the claim for foreign priority would also be appreciated by checking box 12 on PTO Form 326.)

H.2. The Abstract of the Disclosure

On page 2 of the Office Action, portions of the abstract of the disclosure were objected to, namely, the term "comprises" and the phrase "There are disclosed an."

Corrections to such have been made. Please see the above Amendments to the Abstract of the Disclosure.

H.3. The specification

On page 2 of the Office Action, applicant's cooperation was requested in correcting any errors in the specification of which applicant may become aware.

Applicant has checked the specification and has made amendments. Please see the above Amendments to the Specification.

H.4. Claim 4

On page 2 of the Office Action, claim 4 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claim 4 has been amended. It is respectfully submitted that

(17979.doc) (Amendment and Remarks--page 18 of 26)

10/784,553

claim 4 is now in compliance with 35 U.S.C. 112, second paragraph.

H.5. The rejections under 35 U.S.C. 103(a)

On pages 2-3 of the Office Action, claims 1-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yoneda et al. in view of Skraba et al. or Liebert. These rejections are respectfully traversed on the basis of applicant's discussion immediately below in section I of this paper.

I. Applicant's discussion

I.1. The Yoneda et al. reference relates to an easily polymerizable substance, while the Skraba et al. and Liebert references relate to substances that do not polymerize

The Yoneda et al. reference relates to a distillation process for an easily polymerizable substance such as (meth)acrylic acid. On the other hand, the Skraba et al. and Liebert references relate to non-polymerizable substances, namely, hydrocarbon and isoparaffin respectively. To cure the deficiencies of the Yoneda et al. reference, such as to the reboilers set in parallel, it is respectfully submitted that one skilled in the art would not look to the arts of Skraba et al. and Liebert that involve nonpolymerizable substances.

Why would one not look to such arts? The answers can be found in the sections set out below that discuss the arts, problems and solutions of applicant, Yoneda, Skraba et al., and Liebert.

10/784,553

I.2. The art of the Yoneda et al. reference, a second art, and the new art of applicant

The present specification discloses at least two arts for increasing the purification efficiency of an easily polymerizable substance. One is JP-A-131116/2001 (Kokai) and the other is JP-A-254403/2000 (Kokai).

The Yoneda et al. reference, cited by the Patent Office, is an example of one of the arts. In fact, as perhaps recognized by the Patent Office, the Yoneda et al. reference is a counterpart U.S. application of JP-A-131116/2001 (Kokai), which is disclosed on page 2, line 19 of the present specification. The Yoneda et al. reference relates to an art where apparatus are set in series. As disclosed at page 2, lines 9-12 of the present specification, the Yoneda et al. apparatus includes at least two condensers set in series with a distillation column, thereby preventing polymers from forming in apparatus downstream of the condensers, which polymers disadvantageously could otherwise adhere to the insides of such downstream apparatus. Namely, Yoneda et al. does not disclose the object of the present invention that the formation and adhesion of the polymer in the distillation column is prevented by preventing the channeling of the liquid or vapor in the distillation column.

A second art is an art where a vapor-dispersing apparatus is set at a place of connection of a reboiler to a distillation column, thereby preventing a channeling of vapor in the distillation column to thus prevent a polymer from forming in the distillation column to thus adhere to it, wherein the reboiler heat-reboils a liquid from the distillation column and then circulates it. Please see page 2, lines 13-17 of the specification. Namely, the second art does not disclose the object of the present invention.

(17979.doc) (Amendment and Remarks--page 20 of 26)

10/784,553

Independent claim 1 (or the present invention) does not relate to either the first art or second art mentioned above. For example, independent claim 1 does not require condensers in series (and dependent claim 7 requires condensers in parallel, not in series as does the Yoneda et al. reference). Hence, independent claim 1 does not relate to the first mentioned art.

It is respectfully submitted that applicant has in fact defined a new art for applicant's industry. This new art is setting a pair of reboilers in parallel with a distillation column for distillation purification of the acrylic acid family encompassing acrylic acid and its esters.

I.3. Problems facing the first and second mentioned arts and applicant's art

As is disclosed at page 2, line 22 to page 3, line 16, in the present specification, where the purification apparatus is large-sized in order to enhance the productivity of the acrylic acid family, there greatly occurs the formation and adhesion of polymer in the apparatus. Such polymer may clog internal piping. Therefore, the operation of the apparatus is often stopped for the work of removing the adhered polymer. Production efficiency deteriorates.

In particular, as to a reboiler having a structure with many tubes, a polymer adheres to inner surfaces of the tubes, easily causing clogs. Even if clogs do not occur, such adhesion causes a drop in heat-exchange efficiency and a relatively great deterioration in the performance of the entire distillation apparatus.

The first and second mentioned arts have not sufficiently prevented the formation and adhesion of polymers in purification apparatus. Particularly in large-

(17979.DOC) (Amendment and Remarks--page 21 of 26)

10/784,553

sized purification apparatus, even comparatively short-term operation undergoes performance deterioration due to polymer adhesion, and therefore operation needs to be stopped to carry out the work of removing the adhered polymer.

An object of the present invention is to solve the aforementioned problems in the purification of the acrylic acid family by preventing the adhesion of its polymer in purification apparatus. Productivity is thus enhanced.

I.4. Applicant's uniquely identified problems and unique solutions

As disclosed at page 16, lines 11-28 of the present specification, as to the apparatus and process according to the present invention for purification of the acrylic acid family, liquid from the distillation column is reboiled with at least two reboilers that are disposed in parallel to the distillation column. The inclusion of such a structure prevents polymer adhesion to the inside of the distillation column and clogging, without spoiling the treatment ability of the reboilers or spoiling the quality performance of the purification operation when compared with the case where the reboiling treatment is carried out with only one reboiler. The inclusion of such a structure prevents the channeling of liquid or vapor in the distillation column to thus stabilize internal temperature and thereby achieve stabilization of the distillation purification treatment and to efficiently enhance such treatment.

As a result, it is possible to extend intervals between inspection and cleaning operations or other like operations, or actually omit inspection and cleaning operations or other like operations that require the apparatus to shut down. Therefore it is possible to carry out high-quality purification operations durably for a relatively long time,

10/784,553

and therefore it is possible to greatly contribute also to the enhancement of the efficiency of the production of the acrylic acid family or to a reduction in costs of the production of the acrylic acid family.

I.5. The problems and solutions of the Skraba et al. reference

The invention of the Skraba et al. reference relates to a fractionator. This reference shows two reboilers disposed in parallel to a distillation column.

First, as indicated above, the substance treated in the Skraba et al. reference is hydrocarbon. Hydrocarbon is not an easily polymerizable compound.

Second, the object of the Skraba et al. reference is a controlling of the operation of a fractionator by a controlling of the heat input into the fractionator in a manner such that additional heat requirements of the fractionator are more rapidly satisfied by continuously passing a first stream of steam to the fractionator and passing a relatively higher pressure stream of steam into a second reboiler during periods of increased heat requirements. Such does not relate to the object of the present invention: the prevention of the formation and adhesion of polymer in a distillation column by preventing a channeling of liquid or vapor in the distillation column.

In fact, it would appear that channeling would occur in the Skraba et al. apparatus. For example, at column 2, lines 20-24 of Skraba et al., it is disclosed that the second stream of steam (source 44) has a pressure at least three time greater than the pressure of a first stream of steam (source 42). Namely, the running conditions of the reboilers are different. In such a case, the channeling of liquid or vapor will occur. Of course, when channeling does

10/784,553

occurs, there is no problem for Skraba et al. Why? Because hydrocarbon cannot polymerize.

Accordingly, it is respectfully submitted that one skilled in applicant's art would not look to the art of Skraba et al. Further, after the details of the Skraba et al. reference are considered, there can be no teaching or motivation for combining such a reference with the Yoneda et al. reference. This is because neither Sakraba et al. nor Yoneda et al. disclose the object of the present invention that the formation and adhesion of the polymer in the distillation column is prevented by preventing the channeling of the liquid or vapor in the distillation column.

I.6. The problems and solutions of the Liebert reference

The invention of Liebert relates to alkylation of isoparaffin. This reference shows two reboilers disposed in parallel to a distillation column for obtaining isoparaffin from butane as a raw material.

First, as indicated above, isoparaffin is a nonpolymerizable substance. Thus, Liebert cannot teach the object of the present invention: the prevention of the formation and adhesion of polymer in a distillation column by preventing a channeling of liquid or vapor in the distillation column.

Second, the art of Liebert relates to recovering heat: heat generated from the alkylation reaction of isoparaffin is recovered via pipe 27 by one of the reboilers disposed in parallel. The amount of steam passing through pipe 27 depends on the running condition of tower 50. Although the reboilers 33 and 35 are disposed in parallel, their respective controllers 33A and 27A control the conditions of

(17979.DOC) (Amendment and Remarks--page 24 of 26)

10/784,553

the reboilers 33 and 35 independently. The presence of two reboilers in Liebert, therefore, does not appear to relate to any problem of channeling of liquid or vapor in the distillation column. Thus, even if the two reboilers are operated at different conditions, there is no problem in Liebert because isoparaffin is not polymerizable.

Accordingly, it is respectfully submitted that one skilled in applicant's art would not look to the art of Liebert. Further, after the details of the Leibert. reference are considered, there can be no teaching or motivation for combining such a reference with the Yoneda et al. reference.

J. The Information Disclosure Statement mailed October 17, 2004.

The present Office Action is dated October 13, 2004. The undersigned mailed an Information Disclosure Statement to the Patent Office on October 17, 2004 that cited art from the EPO via an EPO Communication dated September 3, 2004. Consideration of the references submitted with the Information Disclosure Statement would be appreciated.

One such reference is the Watson U.S. Patent No. 4,469,558 that was cited as an "A" document in the EP search report. The Watson reference discloses two reboilers that are set in parallel to the distillation column. However, the material treated is styrene, not acrylic acid.

The Watson reference does not disclose the object of the present invention that the formation and adhesion of the polymer in the distillation column is prevented by preventing the channeling of the liquid or vapor in the distillation column.

Further, claim 1 has been amended to recite the relatively great size of the distillation column. As

10/784,553

disclosed at page 3, lines 7-10 of the present specification, particularly as to large-sized purification apparatus, even comparatively short-term operation undergoes performance deterioration due to the adhesion of the polymer.

The other references of the EP search report, even the "X" and "Y" documents, do not show two reboilers that are set in parallel to the distillation column.

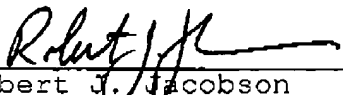
K. Summary

Independent claim 1 positively recites an apparatus for distillation purification of acrylic acid family encompassing acrylic acid and its esters. Claim 1 is thus limited not only to easily polymerizable substances, but to the acrylic acid family. Neither the substances of the Skraba et al. or Liebert references nor their apparatus nor their methods hold any teaching that would suggest a combination with the Yoneda et al. reference. Allowance of the present case is therefore respectfully requested.

Respectfully submitted,

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